AMENDMENTS TO THE CLAIMS:

1. (Original) A mobile terminal with multi-antenna based on CDMA, comprising:

a plurality of groups of radio frequency signal processing modules, for transforming received multi-channel radio frequency signals based on CDMA to multi-channel baseband signals;

a multi-antenna module, for combining said multi-channel baseband signals outputted from said plurality of groups of radio frequency signal processing modules into single-channel baseband signals according to control information received one-off when said multi-antenna module enables a multi-antenna baseband processing; and

a baseband processing module, for providing said control information to said multi-antenna module and baseband processing said single-channel baseband signals outputted from said multi-antenna module.

2. (Original) The mobile terminal of claim 1, wherein said control information at least includes: working status information of the mobile terminal and configuration information of a base-station's antennas.

3. (Previously Presented) The mobile terminal of claim 1, wherein said multi-antenna module includes

a plurality of spatial filters, corresponding to the plurality of groups of radio frequency signals processing modules, each of the plurality of spatial filters setting its working mode according to received instruction, and processing said baseband signals according to received information related to spatial features of signals of each specific path to separate signals of said each specific path from mixed signals;

a combiner, combining signals outputted from each of said spatial filters according to received synchronization information and said instruction;

a synchronization module, providing said information related to spatial features of signals of each specific path to the plurality of spatial filters according to said instruction and said multi-channel baseband signals, and providing said synchronization information to said combiner; and

a controller, receiving said control information from said baseband processing module, and providing said instruction to said synchronization module, the plurality of spatial filters and said combiner.

4. (Original) The mobile terminal of claim 3, wherein said controller includes a time alignment means, for time-aligning said signals outputted from each of the plurality of spatial filters.

5. (Previously Presented) The mobile terminal of claim 1, wherein said multi-antenna module includes:

a plurality of processing modules corresponding to a plurality of transmit antennas in a wireless communication system, for receiving and processing signals from a plurality of transmit antennas, wherein

each of said processing modules corresponding to transmit antenna is composed of a group of spatial filters, and receives and processes signals from a specific transmit antenna, wherein

said group of spatial filters includes a plurality of spatial filters, each setting its working mode according to received instruction and processing said multi-channel baseband signals according to received information related to spatial features of signals of each specific path to separate signals of each specific path from mixed signals;

a combiner, for combining signals outputted from said each group of spatial filters according to received synchronization information and said instruction;

a synchronization module, for providing said information related to spatial features of signals of each specific path to said each group of spatial filters in said each processing module corresponding to transmit antenna according to said instruction and said multi-channel baseband signals, and providing said synchronization information related to signals transmitted by the plurality of transmit antennas to said combiner; and

a controller, for receiving said control information from said baseband processing module and providing said instruction to said synchronization module, the plurality of spatial filters in said each processing module corresponding to transmit antenna and said combiner.

6. (Original) The mobile terminal of claim 5, wherein said combiner includes: a time alignment means, for time-aligning signals outputted from each of said spatial filters.

7. (Previously Presented) The mobile terminal of any of claim 3, wherein each of the plurality of spatial filters includes:

a plurality of multipliers, for multiplying said multi-channel baseband signals by provided corresponding parameters respectively;

a signal combiner, for combining signals outputted from each of the plurality of multipliers and outputting combined results; and

a weight generating module, for executing corresponding operations according to said multi-channel baseband signals and said instruction to provide said corresponding parameters to said plurality of multipliers respectively.

8. (Original) The mobile terminal of claim 7, wherein when said instruction indicates that the mobile terminal is at a cell search stage, only one of said spatial filters is active and a blind equal-ratio-combining algorithm is executed in said weight generating module.

9. (Original) The mobile terminal of claim 8, wherein said blind equal-ratio-combining algorithm includes:

selecting one of said multi-channel baseband signals as reference signals;

applying a multiplication, an integration and a normalization respectively to the reference signals and conjugated signals of the other signals of said multi-channel baseband signals to obtain relative phase differences of said other signals of said multi-channel baseband signals compared with said reference signals; and where in

said corresponding parameters obtained by the plurality of multipliers of the spatial filter respectively are: said parameter obtained by a multiplier corresponding to said reference signals is a constant, said parameters obtained by multipliers corresponding to said other signals of said multi-channel baseband signals are said relative phase differences.

10. (Original) The mobile terminal of claim 7, wherein when said instruction indicates that the mobile terminal is at a normal connected stage, the plurality of spatial filters set the working mode thereof as Rake receiving mode and each of the plurality of spatial filters forms each finger of the Rake receiving, at this time said weight generating module executes a weight generation and said corresponding parameters provided to the plurality of multipliers are weights corresponding to the multi-channel baseband signals obtained by the weight generation.

11. (Original) The mobile terminal of claim 10, wherein the weight generation executed by the weight generating module includes:

(a) de-spreading said multi-channel baseband signals;

(b) selecting a constant parameter as the reference signal and applying a weight estimation to the de-spread signals; and

(c) normalizing each of weights obtained in the weight estimation to obtain the weights respectively corresponding to said multi-channel baseband signals.

12. The mobile terminal of claim 10, wherein the weight generation executed by the weight generating module includes:

(a) de-spreading said multi-channel baseband signals;

(b) selecting a constant parameter as the reference signal and applying an estimation of weights to the de-spread signals;

(c) applying a power estimation to the de-spread signals; and

(d) revising each of weights obtained in the weight estimation to obtain the weights respectively corresponding to the multi-channel baseband signals according to a power signal obtained in the power estimation.

13. (Original) The mobile terminal of claim 10, wherein the weight generation executed by the weight generating module includes:

(a) de-spreading said multi-channel baseband signals;

(b) applying a power estimation to the de-spread signals; and

(c) making a power signal obtained in said power estimation as the reference signal and applying an estimation of weights to the de-spread signals to obtain the weights respectively corresponding to the multi-channel baseband signals.

14. (Previously Presented) The mobile terminal of claim 11, wherein the weight estimation includes LMS (Least Mean Square error) algorithm or N-LMS (Normalized Least Mean Square error) algorithm.

15. (Previously Presented) The mobile terminal of claim 4, wherein said combiner includes:

a plurality of delayers, for delaying each of the output signals from the plurality of spatial filters to obtain synchronized signals under the control of the synchronization module; and

a combiner, for combining the synchronized signals delayed by said plurality of delayers.

16. (Original) The mobile terminal of claim 15, wherein the plurality of delayers can be implemented using FIFO (First In First Out) technology and the value of delayer can be adjusted by controlling the deepness of the FIFO.

17. (Original) The mobile terminal of claim 1, wherein the terminal is applied to mobile terminals or other mobile wireless communication terminals, wireless LAN terminals employing one of following standards: WCDMA, IS95, CDMA2000.

18. (Original) A method for a mobile terminal with multi-antenna based on CDMA, comprising:

(a) transforming received multi-channel radio frequency signals based on CDMA to multi-channel baseband signals;

(b) combining said multi-channel baseband signals into single-channel baseband signals according to control information received one-off when a multi-antenna baseband processing is enabled; and

(c) baseband processing said single-channel baseband signals.

19. (Original) The method of claim 18, wherein said control information at least includes: working status information of the mobile terminal and configuration information of a base-station's antennas.

20. (Previously Presented) The method of claim 18, wherein step (b) includes:

generating a instruction for controlling said combining according to said control information; and

setting a working mode according to said instruction.

21. (Original) The method of claim 20, wherein when the instruction indicates that the mobile terminal is at a cell search stage, step (b) further includes:

(1) selecting one of said multi-channel baseband signals as reference signals;

(2) applying a multiplication, an integration and a normalization respectively to said reference signals and conjugated signals of the other signals of said multi-channel baseband signals to obtain relative phase differences of said other signals of said multi-channel baseband signals compared with said reference signals;

(3) multiplying said reference signals by a constant and multiplying the other signals of the multi-channel baseband signals with said relative phase differences; and

(4) combining results obtained by said multiplications and outputting combined results.

22. (Original) The method of claim 20, wherein when said instruction indicates that the mobile terminal is at a normal connected stage, step (b) further includes:

(b1) obtaining information related to spatial features of signals of each specific path and synchronization information related to the multi-channel baseband signals according to the input multi-channel baseband signals;

(b2) processing the multi-channel baseband signals to separate signals of each specific path from mixed signals according to said information related to spatial features of signals of each specific path; and

(b3) combining separated signals from said mixed signals with different delay ingredients and outputting combined results according to said synchronization information.

23. (Original) The method of claim 22, wherein step (b3) further includes: said signals with different delay ingredients are time-aligned, then combined, and the combined results are outputted.

24. (Original) The method of claim 20, wherein when said instruction indicates that the mobile terminal is at a soft handover stage or the base-station transmits signals by transmit diversity or smart antenna, step (b) includes:

(b1) obtaining information related to spatial features of signals of specific path in each group of multi-channel baseband signals, and synchronization information related to signals transmitted by a plurality of transmit antennas according to a plurality of groups of multi-channel baseband signals;

(b2) processing the multi-channel baseband signals to separate signals of each specific path in each group from mixed signals according to said information related to spatial features of signals of each specific path in each group; and

(b3) combining the separated signals from said mixed signals with different delay ingredients and outputting the combined results according to said synchronization information.

25. (Original) The method of claim 24, wherein step (b3) further includes: said signals with different delay ingredients are time-aligned, then combined, and the combined results are outputted.

26. (Previously Presented) The method of claim 22, wherein processing the multi-channel baseband signals to separate signals of each specific path from mixed signals includes:

(1) multiplying each of the multi-channel baseband signals by a weight corresponding to each of the multi-channel baseband signals obtained by a weight calculation; and

(2) combining weighted signals and outputting combined results.

27. (Original) The method of claim 26, wherein the weight calculation includes:

(a) de-spreading said multi-channel baseband signals;

(b) selecting a constant parameter as the reference signal and applying a weight estimation to the de-spread signals; and

(c) normalizing each of weights obtained in the weight estimation to obtain the weights respectively corresponding to said multi-channel baseband signals.

28. (Original) The method of claim 26, wherein the weight calculation includes:

(a) de-spreading said multi-channel baseband signals;

(b) selecting a constant parameter as the reference signal and applying an estimation of weights to the de-spread signals;

(c) applying a power estimation to the de-spread signals; and

(d) revising each of weights obtained in the weight estimation to obtain the weights respectively corresponding to the multi-channel baseband signals according to a power signal obtained in the power estimation.

29. (Original) The method of claim 26, wherein the weight calculation includes:

(a) de-spreading said multi-channel baseband signals;

(b) applying a power estimation to the de-spread signals; and

(c) making a power signal obtained in said power estimation as the reference signal and applying an estimation of weights to the de-spread signals to obtain the weights respectively corresponding to the multi-channel baseband signals.

30. (Previously Presented) The method of claim 27, wherein the weight estimation includes LMS or N-LMS.

31. (Previously Presented) The method of claim 23, wherein the time-aligning said separated signals from said mixed signals with different delay ingredients includes:

delaying each signals of said specific path with different delay ingredients according to said synchronization information; and

combining delayed synchronization signals.

32. (Original) The method of claim 31, wherein the delay can be implemented using FIFO (First In First Out) technology and the value of said delayer can be adjusted by controlling the deepness of the FIFO.

33. (Original) The method of claim 18, wherein the method is applied to mobile terminals or other mobile wireless communication terminals, wireless LAN terminals employing one of following standards: WCDMA, IS95, CDMA2000.

34. (Original) A multi-antenna processing device, comprising:

a plurality of spatial filters, each of the plurality of spatial filters setting its working modes according to received instruction, and processing multi-channel baseband signals according to received information related to spatial features of signals of each specific path to separate signals of said each specific path from mixed signals;

a combiner, for combining signals outputted from each of said spatial filters according to received synchronization information and said instruction;

a synchronization module, for providing said information related to spatial features of signals of each specific path to the plurality of spatial filters according to said instruction and said input multi-channel baseband signals, and providing said synchronization information to said combiner; and

a controller, for providing said instruction to said synchronization module, the plurality of spatial filters and said combiner according to received control information.

35. (Original) The device of claim 34, wherein said controller includes a time alignment means, for time-aligning said signals outputted from each of the plurality of spatial filters.

36. (Original) A multi-antenna processing device, comprising:

a plurality of processing modules corresponding to a plurality of transmit antennas in a wireless communication system, receiving and processing signals from the plurality of transmit antennas, wherein

each of said processing modules corresponding to transmit antennas is composed of a group of spatial filters, and receives and processes signals from a specific transmit antenna, wherein

said group of spatial filters includes a plurality of spatial filters, each setting its working mode according to received instruction and processing multi-channel baseband signals according to received information related to spatial features of signals of each specific path to separate signals of each specific path mixed signals;

a combiner, for combining signals outputted from said each group of spatial filters according to received synchronization information and said instruction;

a synchronization module, for providing said information related to spatial features of signals of each specific path to said each group of spatial filters in said each processing module corresponding to transmit antenna according to said instruction and said input multi-channel baseband signals, and providing said synchronization information related to signals transmitted by the plurality of transmit antennas to said combiner; and

a controller, for providing said instruction to said synchronization module, the plurality of spatial filters in said each processing module corresponding to transmit antennas and said combiner according to received control information.

37. (Original) The device of claim 36, wherein said combiner includes: a time alignment means, for time-aligning signals outputted from each of said spatial filters.

38. (Previously Presented) The device of claim 34, wherein said control information at least includes: working status information of the mobile terminal and configuration information of a base-station's antennas.

39. (Previously Presented) The device of claim 34, wherein the spatial filter includes:

a plurality of multipliers, for respectively multiplying said input multi-channel baseband signals by provided corresponding parameters;

a signal combiner, for combining signals outputted from each of the plurality of multipliers and outputting combined results; and

a weight generating module, for executing corresponding operations, according to said multi-channel baseband signals and said instruction to respectively provide said corresponding parameters to the plurality of multipliers.

40. (Original) The device of claim 39, wherein when said instruction indicates that the mobile terminal is at a cell search stage, only one of the spatial filters is active, wherein said weight generating module executes a blind equal-ratio-combining algorithm.

41. (Original) The device of claim 40, wherein said blind equal-ratio-combining algorithm includes:

selecting one of said multi-channel baseband signals as reference signals;

applying a multiplication, an integration and a normalization respectively to the reference signals and conjugated signals of the other signals of said multi-channel baseband signals to obtain relative phase differences of said other signals of said multi-channel baseband signals compared with said reference signals; and

said corresponding parameters obtained by the plurality of multipliers of the spatial filter respectively are: said parameter obtained by a multiplier corresponding to the reference signal is a constant, said parameters obtained by multipliers corresponding to the other signals of said multi-channel baseband signals are said relative phase differences.

42. (Original) The device of claim 39, wherein when said instruction indicates that the mobile terminal is at a normal connected stage, the plurality of spatial filters set the working modes thereof as Rake receiving mode and each of the plurality of spatial filters forms each finger of the Rake receiving, at this time said weight generating module executes a weight generation and said corresponding parameters provided to the plurality of multipliers are weights corresponding to the multi-channel baseband signals obtained by the weight generation.

43. (Original) The device of claim 42, wherein the weight generation executed by the weight generating module includes:

(a) de-spreading said input multi-channel baseband signals;

(b) selecting a constant parameter as the reference signal and applying a weight estimation for the de-spread signals; and

(c) applying normalization to each of weights obtained in the weight estimation to obtain the weights respectively corresponding to said multi-channel baseband signals.

44. (Original) The device of claim 42, wherein the weight generation executed by the weight generating module includes:

(a) de-spreading said input multi-channel baseband signals;

(b) selecting a constant parameter as the reference signal and applying an estimation of weights to the de-spread signals;

(c) applying a power estimation to the de-spread signals; and

(d) revising each of weights obtained in the weight estimation to obtain the weights respectively corresponding to the multi-channel baseband signals according to a power signal obtained in the power estimation.

45. (Original) The device of claim 42, wherein the weight generation executed by the weight generating module includes:

(a) de-spreading said input multi-channel baseband signals;

(b) applying a power estimation to the de-spread signals; and

(c) making a power signal obtained in said power estimation as the reference signal and applying weight estimation to the de-spread signals to obtain the weights respectively corresponding to the multi-channel baseband signals.

46. (Previously Presented) The device of claim 43, wherein the weight estimation includes LMS operation or N-LMS operation.

47. (Previously Presented) The device of claim 35, wherein said combiner includes:

a plurality of delayers, delaying each of the output signals from the plurality of spatial filters to obtain synchronized signals under the control of the synchronization module; and

a combiner, for combining the synchronized signals delayed by said a plurality of delayers.

48. (Original) The device of claim 47, wherein the plurality of delayers can be implemented using FIFO (First In First Out) technology and the value of delayer can be adjusted by controlling the deepness of the FIFO.

49. (Original) A mobile terminal, comprising:

a transmitting means, for transmitting signals via an uplink;

a receiving means, wherein the receiving means includes:

a plurality of groups of radio frequency signal processing modules, for transforming received multi-channel radio frequency signals to multi-channel baseband signals;

a multi-antenna module, combining said multi-channel baseband signals outputted from the plurality of groups of radio frequency signal processing modules into single-channel baseband signals according to control information received one-off when said multi-antenna module enables a multi-antenna baseband processing; and

a baseband processing module, providing said control information to said multi-antenna module and baseband processing said single-channel baseband signals outputted from said multi-antenna module.